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Mixed Cropping of Bajra, Mung and Castor in North West Gujarat

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ABSTRACT

A series of field experiments were conducted to find out the suitable economic combination of mixed cropping of Bajra, Mung and Castor in sandy loam soils of North-West agroclimatic zone of Gujarat State under rainfed condition. During experimental period, the successful years were 1984-85, 1988-89 and 1989-90. Mixed cropping of Bajra, Mung and Castor with seed rate of 2.00, 12.00 and 1.00 kg/ha, respectively, is recommended for North-West agroclimatic condition to obtain additional income of Rs. 1706/- ha over sole crop of Bajra without NPK fertilizer.

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INTRODUCTION

Sowing of more than one crop on the same piece of land in the same season (mixed cropping) has been an important characteristic of traditional farming systems under arid condition. Evidence documented by Norman (1974) for Northern Nigeria and Jodha (1979) for different agroclimatic tracts of semi-arid tropical India, shows that more than 50 per cent of the area under rainfed crops is put under some kind of mixed cropping. Rainfed farming is a major practice in the agriculture of the North-West agroclimatic zone. Farmers of this zone are used to practice the mixed cropping to cover the risk of the uncertainties of monsoon. In this connection it seemed highly imperative to study the extent of the mixed cropping of bajra, mung and castor for maximum net realization.

MATERIALS AND METHODS

The field experiments were conducted at Agricultural Research Station, Gujarat Agricultural University, Bhachau (Kutch) during kharif season of the 1984-85 to 1989-90 for six years. Out of six seasons only three i. e. 1984-85, 1988-89 and 1989-90, were successful. The soils were sandy loam in texture and slightly alkaline in reaction (pH 1:2.5, 7.70). From fertility point of view, it can be rated as medium in available N (O.C., 0.19%) and P (41 kg P_2O_5/ha) and high in available K (255 kg K_2O/ha). Bajra cv CJ 104, Mung cv Guj. 2, Castor cv GAUCH 1 and BMC (mixed crops) were sown with 3.75 kg, 20 kg, 5 kg/ha, recommended seed rate and as per treatments, respectively, at the distance of 45 cm between rows for bajra alone and all mixed crops (BMC) treatment, 30 cm between rows for mung alone and 90 x 60 cm between rows and plant for castor alone. FYM was applied in all the plots @ 6 t/ha and chemical fertilizer as per treatment in the doses of 25:12.5:0 kg NPK bajra and mixed crops, 30:20:0 kg NPK for castor and 20:40:0 kg NPK for mung as a basal dose. In all, it comprised 9 treatments in triplicate with the net plot size of 6.0 m x 4.5 m in a randomized block design.

RESULTS AND DISCUSSION

Grain and straw yield of bajra, mung and castor either alone or in mixed cropping varied considerably over the experimental period (Table 1). Maximum grain yield of bajra under year 1984-85, 1988-89 and 1989-90 was registered with treatment No. 5 (bajra 100%, mung 20% and castor 10%), 14 (bajra 100%, mung 20% and castor 100%) and 10 (bajra alone), respectively. However, maximum average grain yield of bajra was noted under 100% bajra, 10% mung and 20% castor with NPK (Treat. No. 6). Thus it seems to be better mixed cropping treatment compared to bajra alone as the yield of mung and castor will be additional. Maximum seed yield of castor wil be additional. Maximum seed yield of castor under 1984-85 and 1989-90 was observed in treatment No. 2 (castor alone with NPK) while that under 1988-89 was registered in treatment No. 11 (castor alone). However, maximum average seed yield of castor was noted in treatment No. 2 (castor alone). Similarly, maximum grain yield of mung was registered under treatment No. 12 (mung alone) during the year 1984-85 and that under treatment No. 3 (mung alone) in the year 1988-89 and 1989-90. However maximum average grain and straw yield of mung was noted under treatment No. 3 (mung alone). On the whole, fertilizers produced marginal increased in the yield of the crops. Even in the average of the three years, fertilizer application altered the yield marginally.

TABLE 1

Yield of sole and mixed crops (kg/ha).

Sr.	*Treat-*	*1984-85*		*1988-89*		*1989-90*		*Average*	
No.	*ment*	*Grain*	*Straw*	*Grain*	*Straw*	*Grain*	*Straw*	*Grain*	*Straw*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Treatment with NPK									
1	Bajra alone	202	3249	1270	3272	1005	3763	826	3428
2	Castor alone	545	--	399	--	378	--	441	--
3	Mung alone	717	945	886	893	353	882	652	907
4	Bajra 100%*	191	3235	1509	2901	686	2591	795	2909
	Mung 15%	47	61	69	57	88	193	68	104
	Castor 15%	7	--	20	--	40	--	22	--
5	Bajra 100%	378	2956	1400	3271	763	2975	847	3067
	Mung 20%	9	32	109	56	96	217	71	102
	Castor 10%	15	--	11	--	18	--	15	--
6	Bajra 100%	276	3736	1380	2929	1072	3404	909	356
	Mung 10%	8	20	46	30	63	123	39	58
	Castor 20%	26	--	44	--	54	--	41	

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
7	Bajra 50%	137	2980	948	1975	870	2901	652	2619
	Mung 40%	115	220	221	289	67	155	134	221
	Castor 40%	21	--	114	--	141	--	92	--
8	Bajra 50%	102	2367	1158	2222	723	2742	661	2444
	Mung 20%	24	46	104	92	69	173	66	104
	Castor 60%	60	--	85	--	212	--	119	--
9	Bajra 50%	244	2158	899	2222	849	3070	664	2483
	Mung 60%	135	444	158	233	90	219	128	299
	Castor 20%	20	--	39	--	86	--	48	--
Treatment without NPK									
10	Bajra alone	290	1900	1331	3457	1084	3610	902	2989
11	Castor alone	409	--	445	--	370	--	408	--
12	Mung alone	770	936	847	840	314	821	644	866
13	Bajra 100%	225	2367	1225	3519	552	2232	667	2706
	Mung 15%	377	555	75	114	109	239	187	303
	Castor 15%	--	--	17	--	41	--	19	--
14	Bajra 100%	136	1253	1563	3333	688	2974	796	2520
	Mung 20%	408	734	133	160	100	236	214	377
	Castor 10%	1	--	18	--	23	--	14	--
15	Bajra 100%	216	1543	1220	3025	653	2263	696	2277
	Mung 10%	259	644	80	76	75	167	138	296
	Castor 20%	3	--	20	--	40	--	21	--
16	Bajra 50%	213	1670	968	2160	658	2249	613	2026
	Mung 40%	481	820	244	338	74	238	266	465
	Castor 40%	3	--	115	--	88	--	69	--
17	Bajra 50%	208	1273	932	2222	725	2290	622	1928
	Mung 20%	472	749	186	172	99	297	252	406
	Castor 60%	3	--	84	--	96	--	61	--
18	Bajra 50%	89	1055	1011	1975	719	2422	606	1817
	Mung 60%	624	799	349	390	167	393	380	527
	Castor 20%	--	--	53	--	59	--	37	--

* % indicate % of recommended seed rate.

TABLE 2

Net realization (Rs/ha) from the different mix cropping and fertilizer treatments.

Treatment	*Year*			*Pooled*
	1984-85	*1988-89*	*1989-90*	
T 1	- 231	+ 1771	1968	1169
T 2	+ 1210	- 406	273	359
T 3	+ 2990	+ 5987	929	3302
T 4	- 58	+ 2553	1619	1371
T 5	+ 4	+ 2800	1873	1559
T 6	+ 68	+ 2241	2714	1674
T 7	+ 234	+ 2890	2479	1868
T 8	- 363	+ 1963	2520	1373
T 9	+ 401	+ 2101	2454	1652
T 10	+ 190	+ 2133	2327	1550
T 11	+ 872	+ 110	473	485
T 12	+ 3583	+ 5989	979	3517
T 13	+ 2282	+ 2462	1626	2123
T 14	+ 2096	+ 3595	1907	2533
T 15	+ 1489	+ 2354	1609	1817
T 16	+ 2713	+ 3389	1753	2618
T 17	+ 2526	+ 2478	2272	2425
T 18	+ 3080	+ 4156	2531	3256
S. E. ±	259.19	549.14	454.53	379.41
C. D. at 5%	751.05	1579.37	1307.26	1043.37
C. V. %	34.99	35.25	43.86	39.12

TABLE 3

ICBR values for mixed crop on net realization basis.

Treatments	*Net realization (Rs./ha)*	*Additional net realization (Rs. /ha) in mixed crops*	*Total cost of cultivation (Rs./ha)*	*Additional cost (Rs./ha)*	*Gross ICBR*	*Net ICBR*
T 1	1169	--	1517	--	--	--
T 2	359	--	1869	--	--	--
T 3	3302	--	1754	--	--	--
T 4	1371	202	1728	211	1:0.96	--
T 5	1559	390	1696	179	1:2.18	1:1.18
T 6	1674	505	1716	199	1:2.54	1:1.54
T 7	1868	699	1856	339	1:2.06	1:1.06
T 8	1373	204	1885	368	1:0.55	--
T 9	1652	483	1739	222	1:2.18	1:1.18
T 10	1550	--	1183	--	--	--
T 11	485	--	1634	--	--	--
T 12	3817	--	1404	--	--	--
T 13	2123	573	1345	162	1:3.54	1:2.54
T 14	2533	987	1386	203	1:4. 84	1:3.84
T 15	1817	267	1350	167	1:1.60	1:0.60
T 16	2618	1068	1526	343	1:3.11	1:2.11
T 17	2425	875	1535	352	1:2.49	1:1.49
T 18	3256	1706	1482	299	1:5.71	1:4.71

Maximum net realization was registered under treatment No. 12 (mung alone) during the year 1984-85 and that under treatment No. 6 (bajra 100%, mung 10% and castor 20%) in the year 1989-90 (Table 2). However, maximum of the average net realization of Rs. 3517/ha was registered under mung alone without NPK followed by mung alone with NPK and 50% bajra, 60% mung and 20% castor without NPK. Among the mixed cropping treatments, maximum net ICBR of Rs. 1:4.71 was registered under 50% bajra, 60% mung and 20% castor (Treat. No. 18) of recommended seed rate without NPK (Table 3).

In case of mixed cropping, significantly mean higher net realization of Rs. 3256/ha and additional income of Rs. 1706/ha with the highest net ICBR Rs. 1:4.71 was registered under 50% bajra, 60% mung and 20% castor of recmmended seed rate without NPK followed by average net realization of Rs. 2533/ha and additional income of Rs. 983/ha with net ICBR of Rs. 1:3.84 under 100% bajra, 20% mung and 10% castor of recommended seed rate without NPK.

General recommendation for farmers

Mixed cropping of bajra, mung and castor with seed rate of 2.00, 12.00 and 1.00 kg/ha, respectively, is recommended for North-West agroclimatic condition to obtain additional income of Rs. 1706/ha over sole crop of bajra without NPK fertilizers.

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